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10/598,390

07/09/2008

Min Wee Low

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EXAMINER

KHOSRAVIANI, ARMAN

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/598,390	Applicant(s) LOW ET AL.	
	Examiner Arman Khosraviani	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/25/2006, 08/28/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 24 recites the limitation "providing a panel according to claim 10" in line 2.

There is insufficient antecedent basis for this limitation in the claim. Claim 10 was canceled, and no claims stand providing a means to construe the panel structure.

3. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. There is insufficient structure for the panel of claim 24 to construe the meets and bounds of the method to assemble a non-leaded semiconductor package having the panel.

4. Claims 22 and 33 recite the limitation "a passive surface [of the semiconductor die], attached to the die attach pads" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. Claim 17 recites one die attach pad.

Claim Rejections - 35 USC § 102

5. The basis for anticipation rejection in this Office action under 35 U.S.C. 102(b):

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 14-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukutomi et al. (US 20040110319).

Regarding claim 14, Fukutomi teaches (Figure 17; ¶¶ 154-158) a method to assemble a leadframe strip assembly comprising: providing a metal foil 31; attaching a carrier tape 32 to the metal foil; and forming a plurality of leadframes 33 in the metal foil, each leadframe comprising a die pad (between terminal portions 38 of leadframes 33) laterally surrounded by a plurality of contact leads 33 (a top surface having terminal portions 38).

Regarding claim 15, Fukutomi teaches (¶ 155, etching off the copper foil 31) forming the plurality of leadframes by an etching process.

Regarding claim 16, Fukutomi teaches (Figure 17b) performing the etching process from one side of the metal foil forming a plurality of isolated leadframes.

7. Claims 17-19, 21-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukutomi et al. (US 20040110319).

Regarding claim 17, Fukutomi teaches (Figure 17; ¶¶ 154-158) a leadframe strip assembly comprising: a carrier tape 32 including a metal foil 31 attached thereon; and a plurality of leadframes 33 formed in the metal foil, each leadframe comprising a die pad (between terminal portions 38 of leadframes 33) laterally surrounded by a plurality of contact leads 33 (a top surface having terminal portions 38) in the metal foil.

Regarding claim 18, Fukutomi teaches the die pad and contact leads of each leadframe of the metal foil are spatially isolated from each other.

Regarding claim 19, Fukutomi teaches (through etching leadframes 33) spatially isolating each leadframe of the metal foil from its neighbor.

Regarding claim 21, Fukutomi teaches the metal foil comprises a thickness of approximately 1mm to approximately 0.01mm (copper foil of 18 μ m in thickness, ¶ 155).

Regarding claim 22, Fukutomi teaches (¶ 158) the leadframe strip assembly further comprises a plurality of semiconductor die 39, each including an active surface with a plurality of die contact pads (on the surface of die 39 connecting one end of bond wires 40 to connection terminals 38) and a passive surface, attached to the die attach pad and electrically connected to the leadframe 33 by a plurality of bond wires 40 connecting the die contact pads and the lead contact areas 38 of the contact leads 33 (a top surface having terminal portions 38).

Regarding claim 23, Fukutomi teaches (¶ 158) encapsulating the plurality of dies 39, contact leads 33 (a top surface having terminal portions 38), wire bonds 40 and upper surface of the carrier tape 32 with mold material 41.

8. Claims 28, 30, and 32 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukutomi et al. (US 20040110319).

Regarding claim 28, Fukutomi teaches (Figure 17; ¶¶ 154-158) a non-leaded semiconductor package having a leadframe strip assembly comprising: a semiconductor die 39; a carrier tape 32 including a metal foil 31 attached thereon; and a

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plurality of leadframes 33 formed in the metal foil, each leadframe comprising a die pad (between terminal portions 38 of leadframes 33) laterally surrounded by a plurality of contact leads 33 (a top surface having terminal portions 38) in the metal foil.

Regarding claim 30, Fukutomi teaches spatially isolating each leadframe of the metal foil from its neighbor.

Regarding claim 32, Fukutomi teaches the metal foil comprises a thickness of approximately 1mm to approximately 0.01mm (~23μm, having 5μm copper plated layer on copper foil of 18μm in thickness, ¶ 155).

9. Claim 34 is rejected under 35 U.S.C. 102(e) as being anticipated by Fukutomi et al. (US 20040110319).

Regarding claim 34, Fukutomi teaches (Figure 17; ¶¶ 154-158) a leadframe strip assembly comprising: means for providing a carrier tape 32 including a metal foil 31 attached thereon; and means for (by etching metal foil; ¶ 155) providing a plurality of leadframes 33 formed in the metal foil, each leadframe means comprising a die pad (between terminal portions 38 of leadframes 33) laterally surrounded by a plurality of contact leads 33 (a top surface having terminal portions 38) in the metal foil.

While not objectionable, the Office reminds Applicant that "product by process" limitations in claims drawn to structure are directed to the product, per se, no matter how actually made. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal

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with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or otherwise. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Thus, no patentable weight will be given to those process steps which do not add structural limitations to the final product. See MPEP 2113.

For example, the language of "means for providing a carrier tape" is considered a method of forming the device of claim 1, and not a limitation of the final product.

Therefore, such limitations are given no patentable weight.

Claim Rejections - 35 USC § 103

10. The basis for obviousness rejections in this Office action under 35 U.S.C. 103(a):

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, which apply and establish a background for determining obviousness under 35 U.S.C. 103(a), is summarized as follows: **(See MPEP Ch. 2141)**

- a. Determining the scope and contents of the prior art;
- b. Ascertaining the differences between the prior art and the claims in issue;
- c. Resolving the level of ordinary skill in the pertinent art; and
- d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37

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CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 25-27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukutomi et al. (US 20040110319).

Regarding claim 25, Fukutomi teaches (Figure 17; ¶¶ 154-158) a non-leaded semiconductor package comprising: a leadframe 33 comprising a die attach pad (between terminal portions 38 of leadframes 33) approximately in its lateral centre, laterally surrounded by a plurality of contact leads 33 (a top surface having terminal portions 38) each having a contact area; semiconductor die 39 including an active surface with a plurality of die contact pads (on the surface of die 39 connecting one end of bond wires 40 to connection terminals 38) and a passive surface, attached to the die attach pad electrically connected to the leadframe 33 by a plurality of bond wires 40 connecting the die contact pads and the lead contact areas 38 of the contact leads 33 (a top surface having terminal portions 38); the upper surface of the die 39, contact leads 33 (a top surface having terminal portions 38), bond wires 40 and space between the die pad and contact leads being encapsulated with mold material 41; and the bottom surface of the die attach pad and contact leads on an essentially common plane, but fails to teach the bottom surface of the non-leaded package comprising mold material.

However, Fukutomi teaches (Figure 19; ¶ 170) the bottom surface of the non-leaded package comprising mold material 56 and the bottom surface of the die attach pad and contact leads on an essentially common plane.

Since both Figures 19 and 17 of Fukutomi teach the method above, it would have been obvious to have incorporated the above features of Figure 19 of Fukutomi in Figure 17 of Fukutomi for the benefit of making packages easier to divide.

Fukutomi teaches discloses the claimed invention except for explicit showing of a die attach pad at the approximately at the lateral centre of the leadframe. It would have been an obvious matter of design choice to have the die attach pad at the approximately at the lateral centre of the leadframe in order to increase density of chips and reduce manufacturing costs as shown in Figure 19.

Regarding claim 26, Fukutomi teaches the leadframe comprises a thickness of approximately 1 mm to approximately 0.01 mm (~23 μ m, having 5 μ m copper plated layer on copper foil of 18 μ m in thickness, ¶ 155).

Regarding claim 27, Fukutomi teaches (¶ 173) the leadframe comprises a thickness of approximately .035mm but fails to teach a thickness of 0.25mm to approximately 0.1mm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the leadframe comprises a thickness of approximately 0.25mm to approximately 0.1mm to provide better support for the semiconductor die, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 29, Fukutomi teaches the die pad and contact leads of each leadframe of the metal foil are spatially isolated from each other.

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12. Claims 20, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukutomi et al. (US 20040110319), in view of LeVasseur et al. (US 4,963,414), and in further view of Goldner et al. (US 20030034697).

Regarding claim 20, Fukutomi teaches the carrier tape comprises a polyimide (§ 156) film and the metal foil comprises copper (§ 155), but fails to teach the carrier tape comprising an adhesive coating and the metal foil comprising OFHC Cu.

However, LeVasseur teaches the carrier tape 4 comprising an adhesive coating (col. 4, ll. 47-61) and the metal foil 13 comprising OFHC Cu (col. 7, ll. 20-47).

Since both LeVasseur and Fukutomi teach the method above, it would have been obvious to have incorporated the above features of LeVasseur in Fukutomi for the benefit of facilitating a good bond between the metal foil and the carrier tape and facilitating heat dissipation away from the semiconductor die (col. 2, ll. 43-62).

The combination of LeVasseur and Fukutomi fails to teach a silicon adhesive coating.

However, Goldner teaches (§§ 205 and 214) using a silicon adhesive coating.

Since Goldner in combination with LeVasseur and Fukutomi teach the method above, it would have been obvious to have incorporated the above features of Goldner in the combination of LeVasseur and Fukutomi for the benefit of facilitating a thermally, chemically, and mechanically stable bond to ensure the integrity of the assembled components during device operation.

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Regarding claim 33, Fukutomi teaches (§ 158) the leadframe strip assembly further comprises a plurality of semiconductor die 39, each including an active surface with a plurality of die contact pads (on the surface of die 39 connecting one end of bond wires 40 to connection terminals 38) and a passive surface, attached to the die attach pad and electrically connected to the leadframe 33 by a plurality of bond wires 40 connecting the die contact pads and the lead contact areas 38 of the contact leads 33 (a top surface having terminal portions 38).

Regarding claim 31, Fukutomi teaches the carrier tape comprises a polyimide (§ 156) film and the metal foil comprises copper (§ 155), but fails to teach the carrier tape comprising an adhesive coating and the metal foil comprising OFHC Cu.

However, LeVasseur teaches the carrier tape 4 comprising an adhesive coating (col. 4, ll. 47-61) and the metal foil 13 comprising OFHC Cu (col. 7, ll. 20-47).

Since both LeVasseur and Fukutomi teach the method above, it would have been obvious to have incorporated the above features of LeVasseur in Fukutomi for the benefit of facilitating a good bond between the metal foil and the carrier tape and facilitating heat dissipation away from the semiconductor die (col. 2, ll. 43-62).

The combination of LeVasseur and Fukutomi fails to teach a silicon adhesive coating.

However, Goldner teaches (§§ 205 and 214) using a silicon adhesive coating.

Since Goldner in combination with LeVasseur and Fukutomi teach the method above, it would have been obvious to have incorporated the above features of Goldner

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in the combination of LeVasseur and Fukutomi for the benefit of facilitating a thermally, chemically, and mechanically stable bond to ensure the integrity of the assembled components during device operation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arman Khosraviani whose telephone number is 571-272-6402. The examiner can normally be reached Monday-Friday, 8am - 5pm (Eastern Time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on 571-272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Arman Khosraviani/
Examiner, Art Unit 2818
7/8/2009

/DAVID VU/
Primary Examiner, Art Unit 2818